REMARKS

Status of the claims:

With the above amendment, claim 1 has been amended. Claims 1-5 and 7-8 are pending and ready for further action on the merits. No new matter has been added by way of the above amendment. The amendment to claim 1 has support at page 21 in the fifth paragraph of the written description. It is submitted that the changes to claim 1 noted above are responsive to "requirements of form" and should be entered of record and considered by the Patent Examiner under 37 CFR §1.116(b). These changes at least place the claim into better form for consideration on appeal as another basis for entry and consideration. Reconsideration is further respectfully requested in light of the following remarks.

Rejections under 35 USC §112, second paragraph

Claims 1-5 and 7-8 have been rejected under 35 USC §112, second paragraph as being indefinite. The Examiner again asserts that a Poisson's ratio in a longitudinal direction (MD) and in a transverse direction (TD) are only for film in a tape form or for a film that has been oriented with directional properties.

Applicants traverse.

Applicants submit that one of skill in the art would readily understand that a polyamide film could have directional properties. Applicants herein submit the following claims from three U.S. patents wherein polyamide films are claimed that have directional properties. Please see the attached claims from US Patent No. 6,177,384, US Patent No. 6,096,419, and US Patent No. 5,645,918. All of these patents claim polyamide films that have directional properties. In other words, Applicants submit that those of skill in the art recognize that polyamide films can have directional properties. The rejection is inapposite. Withdrawal of the rejection is warranted and respectfully requested.

Rejections under 35 USC §103

Claims 1-5 and 7-8 are rejected under 35 USC §103(a) as being unpatentable over Tamaru '989 (US Patent No. 5,603,989) in view of Tsukuda '938 (US Patent No. 5,993,938) and Tsukuda '220 (US Patent No. 6,274,220).

This rejection is traversed for the following reasons.

Present Invention

The present invention relates to an aromatic polyamide film characterized in that the Poison's ratio of the traverse

direction (TD) to the longitudinal direction (MD) is less than 0.4.

Disclosure of Tomaru '989

Tomaru '989 discloses a coating method in which a surface of a flexible support made of plastic film, paper, metal foil, or the like, is continuously and uniformly coated with a coating composition at a high speed by means of an extrusion coating apparatus. The object of the invention of Tomaru '989 is achieved by a coating method that includes continuously running a surface of a flexible support, supported by a pair of support rolls, along a back edge surface and a doctor edge surface. Then, the method comprises coating the surface of the support with a coating composition in a region between the pair of support rolls by an extrusion coating apparatus which extrudes the coating composition continuously from a top end portion of a slot onto the surface of the support.

Tomaru '989 fails to disclose a Poison's ratio for its coating method.

Disclosure of Tsukuda '938

Tsukuda '938 discloses an aromatic polyamide film, wherein on at least one face thereof the number of projections of height at least 20 nm but less than 50 nm is from 10^3 to 10^8 per mm^2.

The number of projections that have a height of at least 50 nm but less than 100 nm is from 0 to $3x10^4$ per mm^2. Further, Tsukuda '938 offers a method of producing an aromatic polyamide film. The method includes obtaining a solution by adding to an aromatic polyamide solution a particle-containing slurry formed by dispersing particles of particle diameter 10 to 300 nm in a liquid medium of 10 poise or less. The amount of said particles added relative to the aromatic polyamide is 0.005 to 4.5 wt %, with the relative standard deviation (in the diameters of said particles) being no more than 0.8. Furthermore, Tsukuda '938 discloses a particle-containing slurry where the initial filterability index Q1 of said particle-containing slurry and the filterability index Q2 after the passage of 500 ml of liquid satisfy the following relation. $Q2/Q1 \geq 0.3$

The film of Tsukuda '938 is used for flexible printed substrates, capacitors, printer ribbons, magnetic recording media, for computer external memory, and for digital video tape.

Tsukuda '938 fails to disclose a method wherein the Poison's ratio can be controlled.

Disclosure of Tsukuda '220

Tsukuda '220 discloses aromatic polyamide resin moldings comprising at least one surface that is 1.0 nm or more in root-mean-square roughness and is 80 nm or less in 10-point average roughness. The roughness as determined by atomic force

microscopy is 9.8 GPa or more in tensile Young's modulus at least in one direction. The aromatic polyamide resin moldings of Tsukuda '220 are used as material for film, or for film for magnetic recording medium that is resistant to scraping and has uniform surface protrusions.

Tsukuda '220 fails to disclose a method wherein the Poison's ratio can be controlled.

Removal of the Rejection over Tamaru '989 in view of Tsukuda '938 and Tsukuda '220

The Examiner asserts that both of the Tsukuda '938 and Tsukuda '220 disclose aromatic polyamide film as a support (see column 13, line 31 and 50 and column 14, lines 39-53 in Tsukuda '938 and column 10, lines 54-55 and 65-66 and column 11, lines 40-44, and column 12, lines 3-8, and column 15, lines 22-24 in Tsukuda '220).

Further, the Examiner asserts that the process for making a polyethylene naphthalate and aromatic films are well known to those of skill in the art. However, in the prior art, and in particular, the cited references Tsukuda '220 and Tsukuda '938, only general processing conditions are taught (i.e., stretching ratio and temperature, etc.) for making a polyethylene naphthalate and aromatic films, which are well known as methods

for controlling general film properties, mechanical properties such as Young's modulus, and heat shrinkage properties, etc.

However, it is noted that the Poison's ratio cannot be controlled by these known processes. As was mentioned in the previous response (of May 6, 2002), the Poison's ratio in the present invention is controlled by adjusting stretching velocity, which is not taught or suggested in the prior art or any of the cited references. By using this new method, the present invention makes it possible to obtain films with similar Tensile Modulus ratios having different Poison's ratios. The Examiner is invited to compare Example 1 with Comparative Example 2, and Example 2 with Comparative Example 1 in the present written description. This method was heretofore unknown.

The Examiner further says that the measurement of the Poison's ratio is also well known in the art. However, it is pointed out that the disclosed method in Tomaru '989 is limited to a general explanation which lacks concrete measuring conditions. As the Poison's ratio is defined under specified measuring conditions, the Poison's ratio of Tomaru '989, which lacks measuring conditions, provides no relevant information. In other words, it says nothing. Accordingly, one of ordinary skill in the art would not know if the Poison's ratio is the same as the Poison's ration in the instant invention. The Poison's ratio in Tomaru '989 is used as one of the production

conditions for preparing a uniform coating, which is directed to a macroscopic phenomenon. In contrast, the Poison's ration of the instant invention is used for specifying films with almost no reading errors during high-speed recording/reproducing. This is a microscopic phenomenon. Because of this difference in the objects of the respective inventions (i.e., macroscopic vs. microscopic), one of skill in the art would surmise that the Poison's ratio values in Tomaru '989 differs from the Poison's ratio in the present invention.

Moreover, as aromatic polyamide films are produced by solution casting processes, and because the polymer structure of the aromatic polyamide is very rigid, the stretching velocity and the stretching rate should be controlled in a very narrow range. This means that controlling the stretching velocity in the case of aromatic polyamide films is much more difficult than the control of stretching velocity in the case of polyester films, which can be generally produced by fusion casting processes. Accordingly, one of ordinary skill in the art would acknowledge that the present invention is not obvious over the teaching of any process of producing polyester films.

Further, Applicants draw the Examiner's attention to the surprisingly superior properties of the present invention in terms of Error Rate (see Table 1 of the written description). In the Examples of the present application, the increase in

Error Rate is negligible when a running speed of 200 inch/sec is used versus a running speed of 100 inch/sec. One of ordinary skill in the art would recognize that a running speed of 200 inch/sec is a much more severe condition than a running speed of 100 inch/sec. Further, in the Comparative Examples when a Poison's ratio is not less than 0.4, the increase is observed.

Applicants are unable to submit any direct evidence that the Poison's ratio in Tomaru '989 is outside of the claimed range, because the film in Tomaru '989 could not be reproduced. This is because Tomaru '989 does not disclose how to make their film. Thus, any disclosure about Poison's ratio in Tomaru '989 must be considered meaningless because one of ordinary skill in the art would not be able to make the film.

For the above reasons, Applicants submit that the rejection over Tamaru '989 in view of Tsukuda '938 and Tsukuda '220 is inapposite. Withdrawal of the rejection is warranted and respectfully requested.

With the above remarks and amendments, it is believed that the claims, as they now stand, define patentable subject matter such that a passage of the instant invention to allowance is warranted. A Notice to that effect is earnestly solicited.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a three (3) month extension of time

for filing a reply in connection with the present application, and the required fee of $930.00 is attached hereto.

If any questions remain regarding the above matters, please contact Applicant's representative, T. Benjamin Schroeder (Reg. No. 50,990), in the Washington metropolitan area at the phone number listed below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachments

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims have been amended as follows:

1. (Twice Amended) An aromatic polyamide film characterized in that the Poison's ratio of the traverse direction (TD) to the longitudinal direction (MD) [longitudinal direction (MD) to the traverse direction (TD)] is less than 0.4.

TABLE 1-continued

	Composition	young's modulus (MD/TD:GPa)	Dimensional change (%)	Flatness after heat treatment (%)	Oligomer content (WT %)	Mw/Mn	Printing quality
Comparative Example 4	1	10.29/8.82	0.2	less than 60	less than 0.2	2.5	X
Comparative Example 5	1	10.29/8.82	0.3	less than 60	0.3	2.7	X
Comparative Example 6	1	10.29/8.82	0.3	less than 60	0.2	2.5	X

What is claimed is:

1. An image transfer material for thermal recording comprising a base film and, on one surface of the base film, a layer of colouring material, which base film comprises an aromatic polyamide and has a Young's modulus E_{MD} in the longitudinal direction, measured at 20° C. and at a relative humidity of 60%, of at least 6.86 GPa, and which base film is in a substantially flat condition and is capable of maintaining a substantially flat condition after heat treatment thereof at 200° C. for 10 minutes in the absence of an applied tension.

2. The image transfer material according to claim 1, wherein the base film has a dimensional stability such that, after heat treatment at 200° C. for 10 minutes in the absence of applied tension, the % dimensional change is 2% or less.

3. The image transfer material according to claim 1 or 2, wherein the base film contains no more than 0.5 wt % of oligomer having a molecular weight of 1000 or less.

4. The image transfer material according to claim 1, wherein the following formula is satisfied:

$$Mw/Mn \leqq 4.5$$

where Mw is the weight average molecular weight of the aromatic polyamide of the base film, and Mn is the number average molecular weight thereof.

5. The image transfer material according to claim 1, wherein the following formulae are satisfied:

$$E_{MD} \geqq E_{TD} \times 1.1$$

$$E_{TD} \geqq 0.86 \text{ GPa}$$

where E_{TD} is the Young's modulus of the base film at 20° C. and at a relatively humidity of 60% in the transverse direction.

6. An image transfer material for thermal recording comprising a base film and, on one surface of the base film, a layer of colouring material, which base film comprises an aromatic polyamide and has a Young's modulus E_{MD} in the longitudinal direction, measured at 20° C. and at a relative humidity of 60%, of at least 6.86 GPa, and which base film is in a substantially flat condition and is capable of maintaining a substantially flat condition after heat treatment thereof at 200° C. for 10 minutes in the absence of an applied tension, and wherein said base film has a width of 100 mm or more and, as the colouring material of the said layer thereof, a dye sublimation type colouring material.

7. An image transfer material for thermal recording comprising a base film and, on one surface of the base film, a layer of colouring material, which base film comprises an aromatic polyamide and has a Young's modulus E_{MD} in the longitudinal direction, measured at 20° C. and at a relative humidity of 60%, of at least 6.86 GPa, and which base film is in a substantially flat condition and is, during formation, controlled such that the difference in temperature across the film is no more than 10° C. at any of two selected points adjacent and upstream of a film forming die, and said base film is capable of maintaining a substantially flat condition after heat treatment thereof at 200° C. for 10 minutes in the absence of an applied tension.

8. An image transfer material for thermal recording comprising a base film and, on one surface of the base film, a layer of colouring material, which base film comprises an aromatic polyamide and has a Young's modulus E_{MD} in the longitudinal direction, measured at 20° C. and at a relatively humidity of 60%, of at least 6.86 GPa, and which base film is in a substantially flat condition and is, during formation adjacent a die exit, controlled such that the difference in thickness of said film across its width is no more than 10%, and said base film is capable of maintaining a substantially flat condition after heat treatment thereof at 200° C. for 10 minutes in the absence of an applied tension.

9. An image transfer material for thermal recording comprising a base film and, on one surface of the base film, a layer of colouring material, which base film comprises an aromatic polyamide and has a Young's modulus E_{MD} in the longitudinal direction, measured at 20° C. and at a relative humidity of 60%, of at least 6.86 GPa, and which base film has its temperature controlled during heat treatment thereof such that, at respective points on the film and spaced apart from one another in a transverse direction relative to the film, any variations in temperature to no more than 5% and said base film is in a substantially flat condition and is capable of maintaining a substantially flat condition after heat treatment thereof at 200° C. for 10 minutes in the absence of an applied tension.

10. An image transfer material for thermal recording comprising a base film and, on one surface of the base film, a layer of colouring material, which base film comprises an aromatic polyamide and has a Young's modulus E_{MD} in the longitudinal direction, measured at 20° C. and at a relative humidity of 60%, of at least 6.86 GPa, and which base film has its water vapor content controlled during heat treatment thereof such that, at respective points on the film and spaced apart from one another in a transverse direction relative to the film, any variations in water vapor content to no more than 5% and said base film is in a substantially flat condition and is capable of maintaining a substantially flat condition after heat treatment thereof at 200° C. for 10 minutes in the absence of an applied tension.

11. An image transfer material for thermal recording comprising a base film and, on one surface of the base film, a layer of colouring material, which base film comprises an aromatic polyamide and has a Young's modulus E_{MD} in the longitudinal direction, measured at 20° C. and at a relative humidity of 60%, of at least 6.86 GPa, and which base film is in a substantially flat condition and, contacted with an extraction solvent in a moving condition relative to the film to extract from the film any casting solvent and/or salt remaining in the film, and is capable of maintaining a substantially flat condition after heat treatment thereof at 200° C. for 10 minutes in the absence of an applied tension.

12. The image transfer material according to claim 11, wherein said extraction solvent is removed from the film prior to thermal setting of the film.

* * * * *

TABLE 1

	Substrate film				Curls of magnetic tape		
		Heat-shrinkage					
	Thickness (μm)	in TD direction (%)	Rz (nm)	μK (-)	Direction	Height of curls	Reproducibility
Example 1	4.5	1.5	69	0.27	+	○	○
Example 2	4.5	1.5	25	0.50	+	○	○
Example 3	4.5	0.9	63	0.28	+	○	○
Example 4	5.4	2.6	70	0.30	−	○	○
Comparative example 1	4.5	0.1	58	0.25	+	×	×
Comparative example 2	4.5	8.3	72	0.26	−	×	×
Comparative example 3	4.5	1.3	7	2.3	+	× to ○	×

Industrial Applicability

A magnetic recording medium having a high degree of flatness with small curls and a high recording density is produced by using an aromatic polyamide film in accordance with the present invention.

What is claimed is:

1. An aromatic polyamide film having a heat-shrinkage in the TD direction at 220° C. of 0.2 to 8% under a load of 80 kg/cm², and an average ten-point roughness Rz on a surface that is opposite to a surface for providing a magnetic layer of 10 to 200 nm.

2. An aromatic polyamide film according to claim 1, wherein the friction coefficient of said surface that is opposite to a surface for providing a magnetic layer is in a range of 0.1 to 2.

3. An aromatic polyamide film according to claim 1, wherein said heat-shrinkage in the TD direction at 220° C. is 0.2 to 5% under a load of 80 kg/cm².

4. An aromatic polyamide film according to claim 1, wherein a layer which forms said surface that is opposite to a surface for providing a magnetic layer includes particles having an average particle diameter of 0.01 to 2.0 μm over a range from 0.01 to 10 wt %.

5. An aromatic polyamide film according to claim 1, wherein the tensile Young's modulus E_{MD} in the longitudinal direction and the tensile Young's modulus E_{TD} in the transverse direction satisfy the relationship:

$$0.5 \leq E_{MD}/E_{TD} \leq 2$$

6. An aromatic polyamide film according to claim 1, wherein a moisture absorption rate is not more than 4%.

7. A magnetic recording medium, comprising an aromatic polyamide film according to any one of claims 1 to 6, wherein a magnetic layer is provided on a surface of said aromatic polyamide film.

* * * * *

TABLE 1-2-continued

	Strength (kg/mm²)		Elongation (%)		Moisture Absorption	Running	
	MD	TD	MD	TD	(%)	Property	Durability
Comparative Example 3	34	41	50	44	2.5	×	×
Comparative Example 4	44	43	75	75	2.8	×	×
Comparative Example 5	30	29	75	70	2.6	×	×

What is claimed is:

1. A magnetic recording medium, comprising:

a base film consisting essentially of an aromatic polyamide, said base film having opposing surfaces and a longitudinal direction, and

a magnetic layer formed on at least one of said opposing surfaces;

said base film being characterized by:

(a) a tensile Young's modulus of about 700 kg/mm^2 or more in at least one direction,

(b) a dimensional change of about 2% or less when a load of 1 kg/mm^2 is applied at 100° C. for 10 minutes in said longitudinal direction of said base film, and

(c) materials extractable with methylene chloride in an amount of no less than about 0.1 ppm and no greater than about 0.5 wt %.

2. A magnetic recording medium according to claim 1, wherein at least one of said opposing surfaces of said base film further comprises a center-line mean depth of about 2 nm to 500 nm, a center-line mean surface roughness of about 0.1 nm to 100 nm, and a ten-point mean roughness of about 2 nm to 500 nm.

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